SPECTRUM FOR ADVANCED MOBILE SERVICES

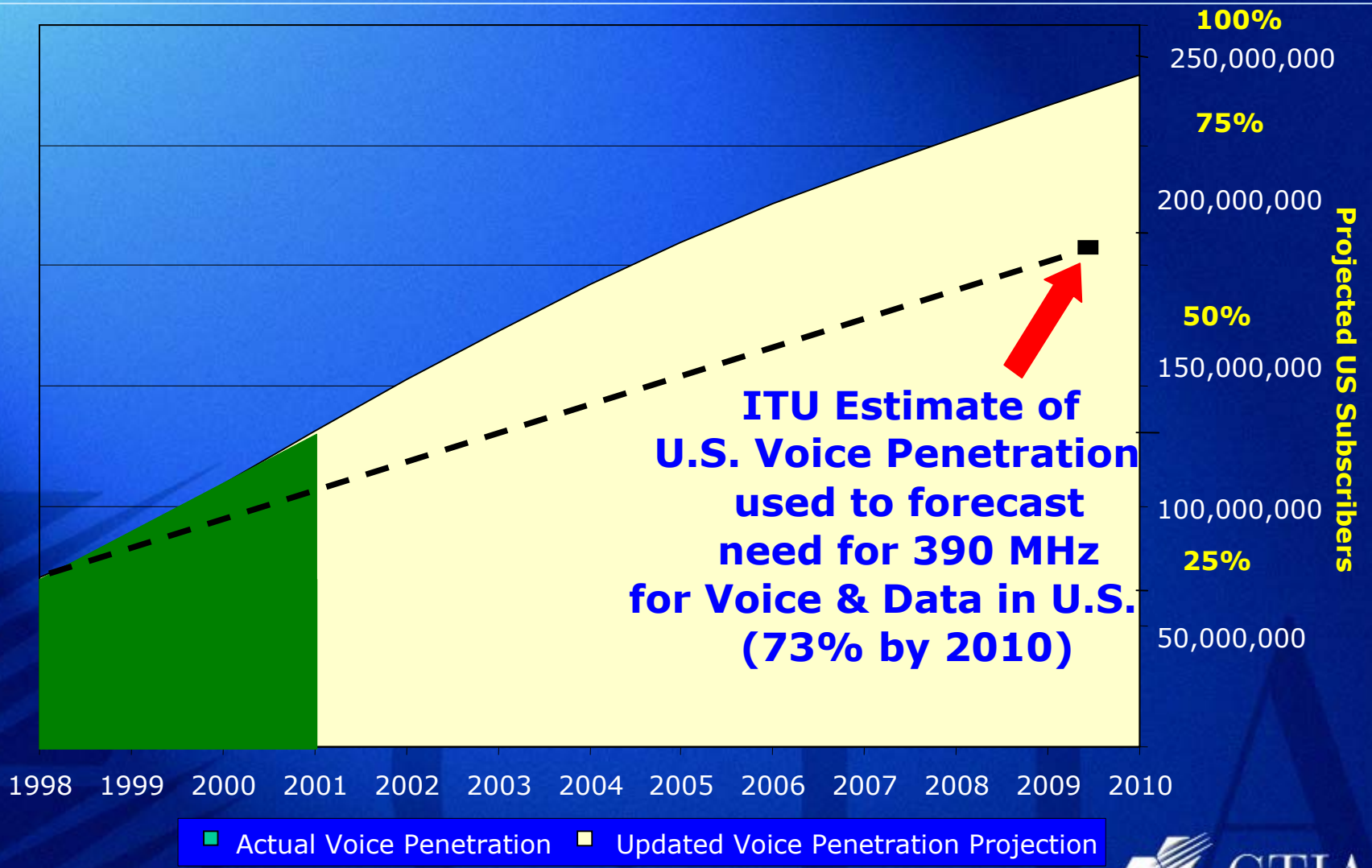
Presentation of the
Cellular Telecommunications &
Internet Association (CTIA)

May 2002

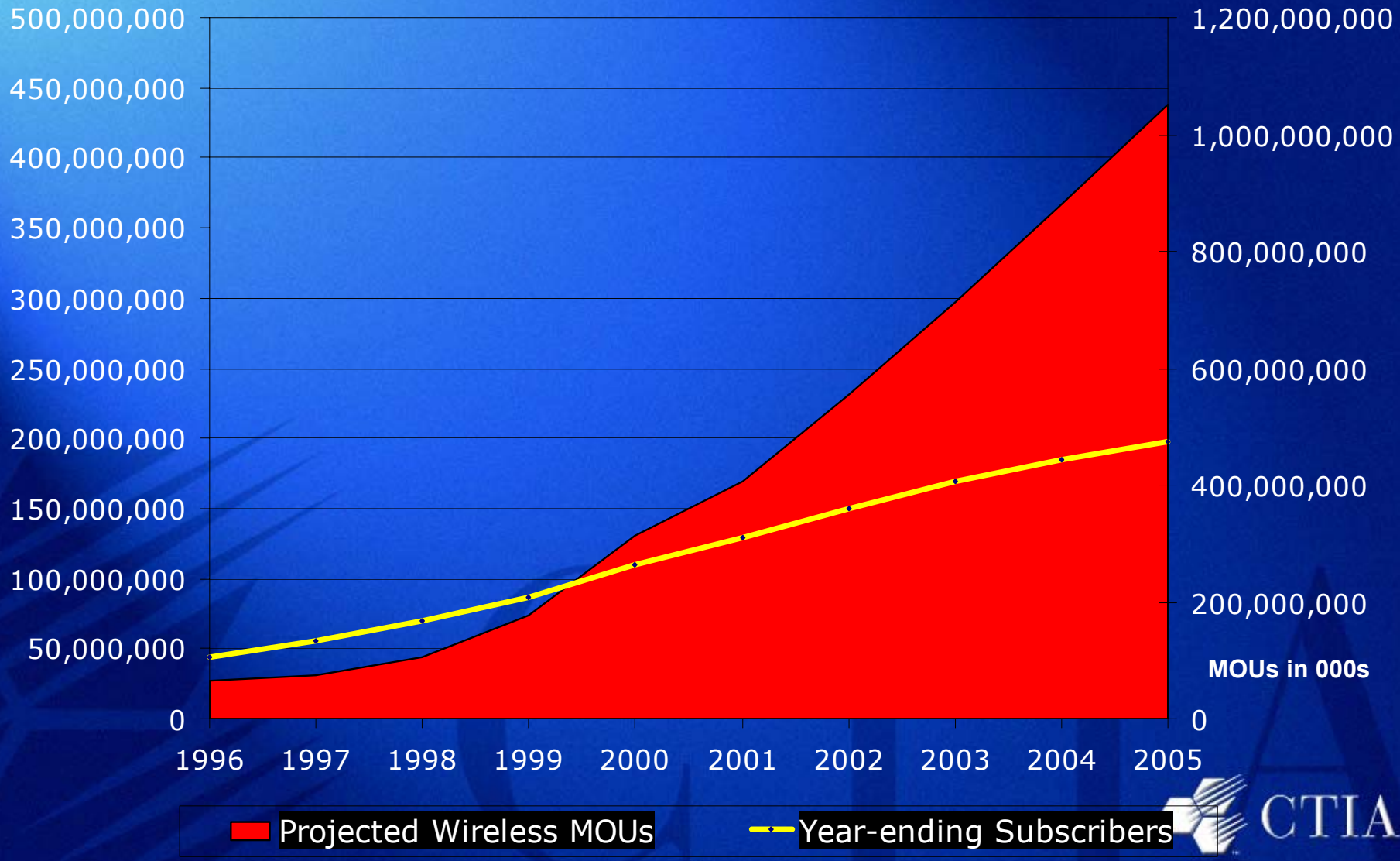
CURRENT WIRELESS TRENDS CONFIRM THAT SIGNIFICANT ADDITIONAL SPECTRUM WILL BE REQUIRED FOR ADVANCED SERVICES BY 2010

- Wireless Voice alone justifies the need for more spectrum
  - Penetration figures outpacing projections
  - Minutes of use are growing dramatically faster than expected
    - In last six months of 2001, consumers used more minutes than in all of 2000
    - Consumers are increasingly turning to wireless as a substitute for wireline
  - Technical upgrades have been essential to keep pace, but cannot handle increasing demand for long
- Wireless Data is also projected to grow rapidly
  - Wireless data penetration in the U.S. is projected to top 50% within five years
  - Projections for wireless data subscribers range from over 26 to 96 million users within five years

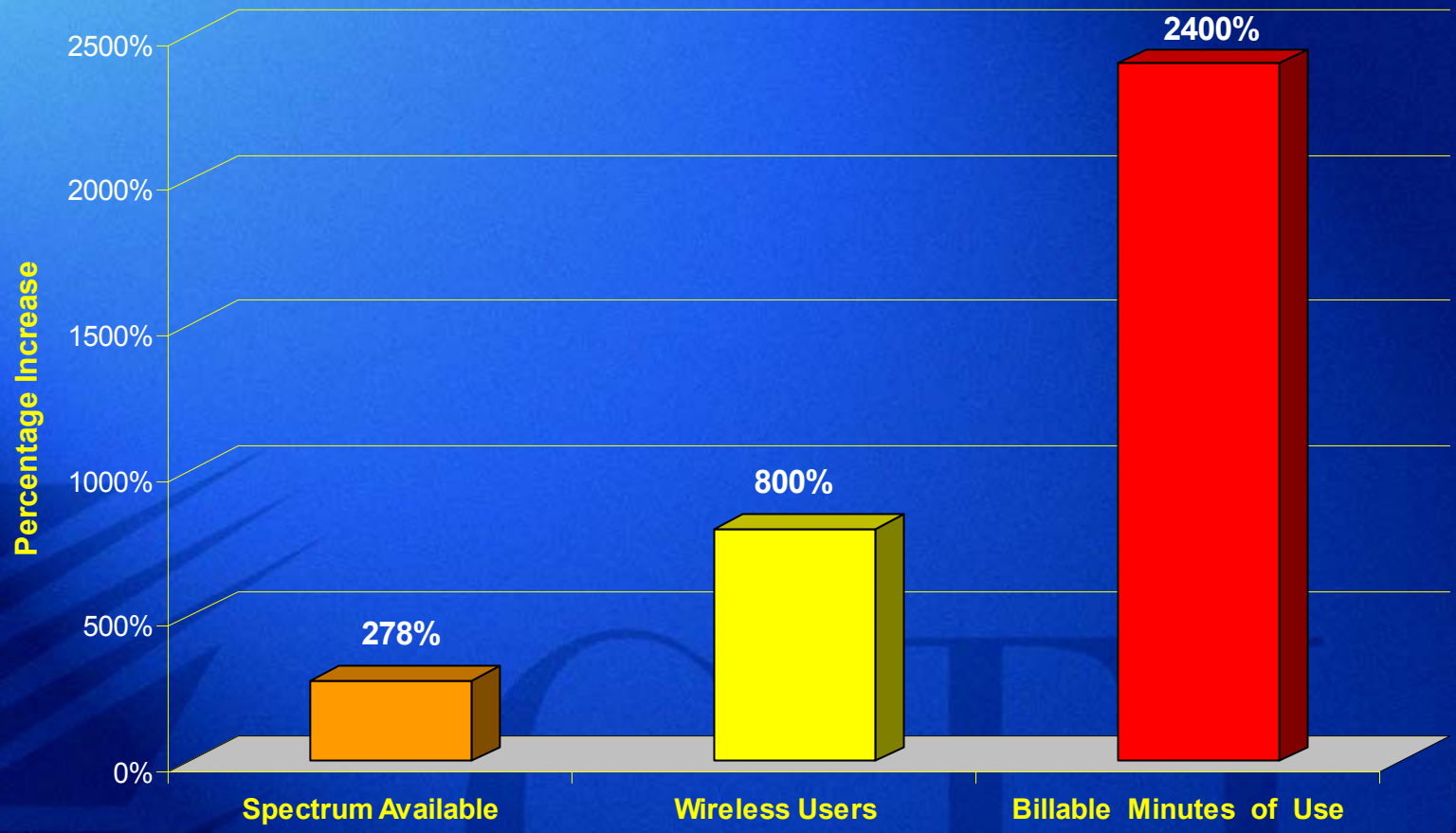
U.S. VOICE GROWTH BEATING ITU PROJECTIONS



200 MILLION U.S. WIRELESS SUBSCRIBERS
1.1 TRILLION MINUTES OF USE BY 2005



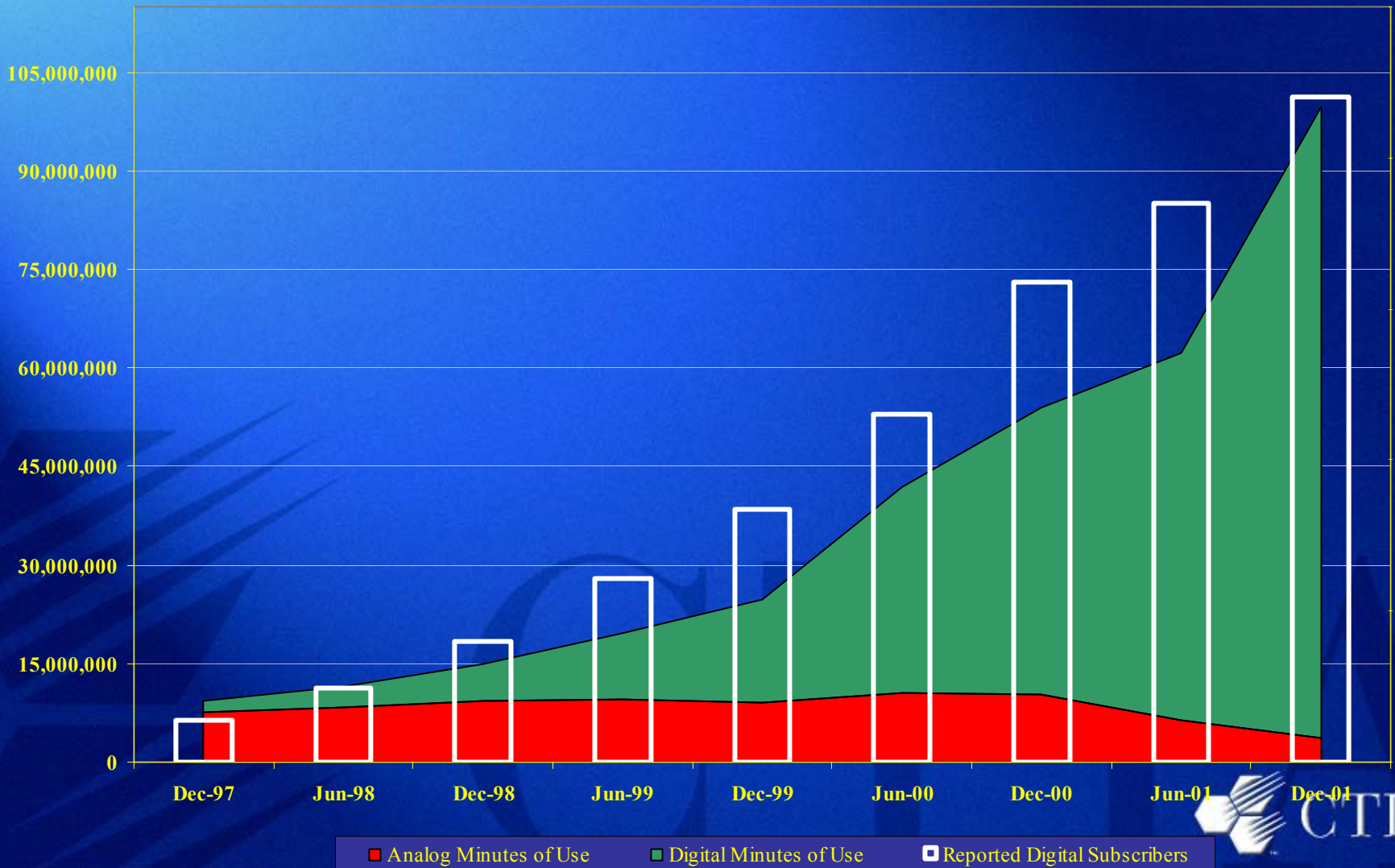
PERCENTAGE GROWTH IN THE U.S. WIRELESS INDUSTRY, 1993-2001



85 PERCENT OF ALL U.S. WIRELESS SUBSCRIBERS ARE ALREADY DIGITAL

CTIA

AS DIGITAL SUBSCRIBERSHIP GROWS, MORE CAPACITY IS BOTH CREATED – AND CONSUMED



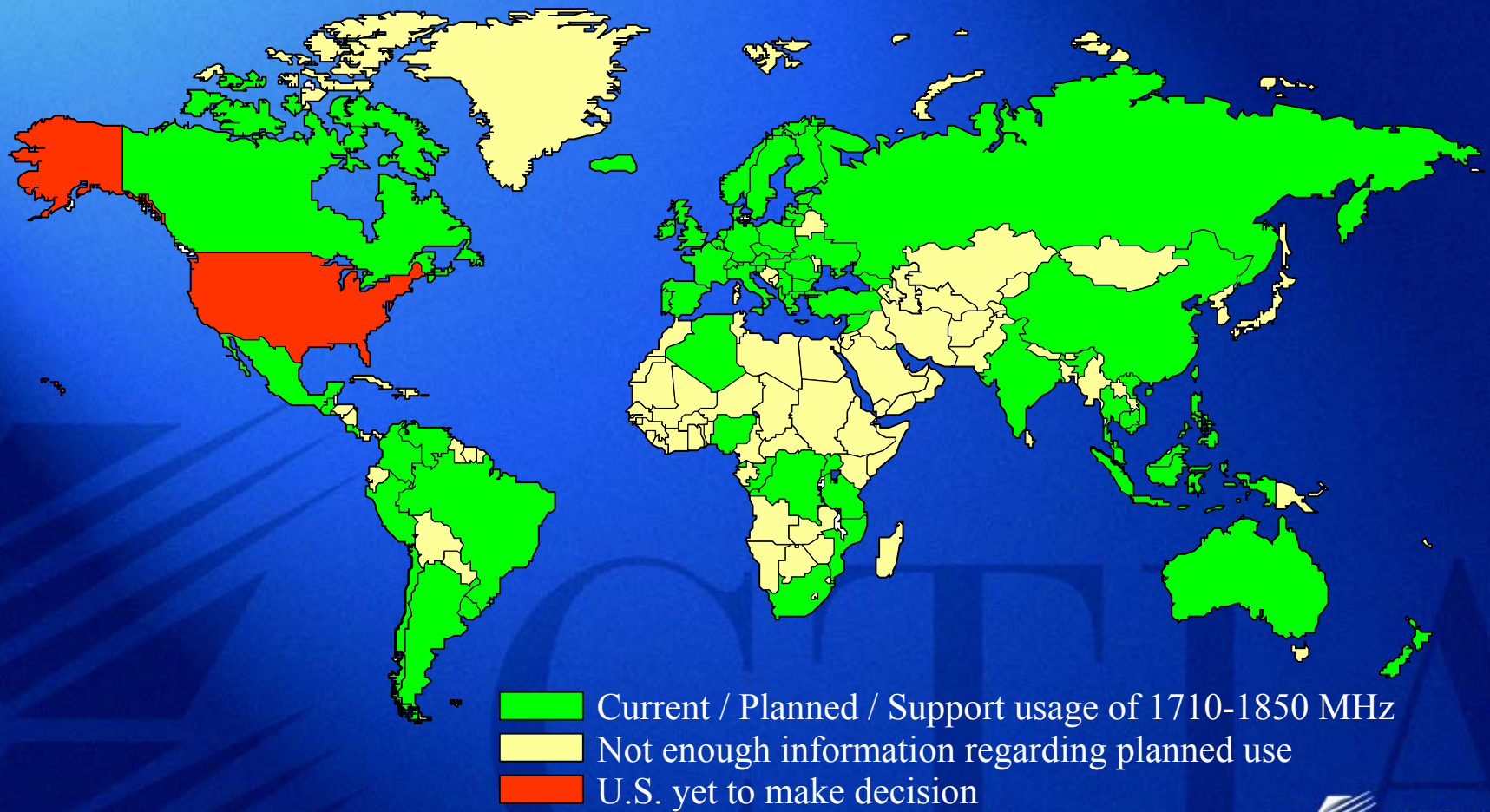
WIRELESS DATA SERVICE PROJECTIONS – TAKE YOUR PICK

- In-Stat/MDR projects 52 million wireless data subscribers in 2005; 39 million business wireless data users in 2006.
- In-Stat/MDR predicts two-thirds of American workers will use wireless devices as part of their jobs by 2004.
- Gartner Group projects 90 percent of professionals / telecommuters will use high-speed wireless data services by 2005, with 137 million wireless data users in North America.
- AMI Partners projects half of entire U.S. workforce to be mobile by 2006, totaling 67 million workers, with over 26.4 million commercial wireless data users.
- Jupiter Media Metrix estimates U.S. wireless web users will grow to 96 million by 2005.
- Ovum projects overall U.S. wireless data penetration of 67 percent by 2007.

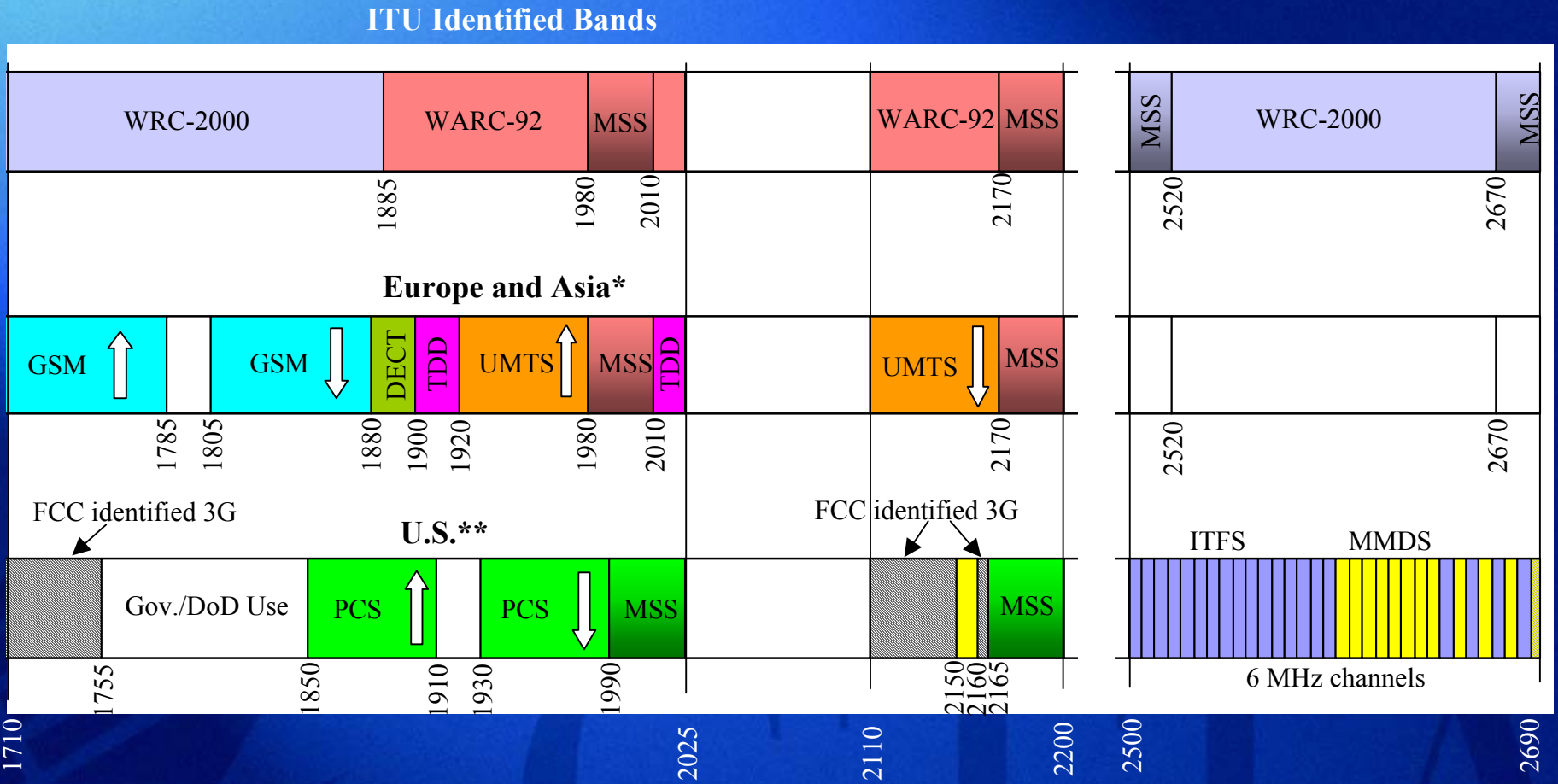
SECURING ADDITIONAL *HARMONIZED* SPECTRUM WILL PROMOTE:

- Growth in wireless services
- Lower prices for consumers
- Efficient spectrum management

GLOBAL USE OF 1710-1850 MHZ FOR MOBILE SERVICES



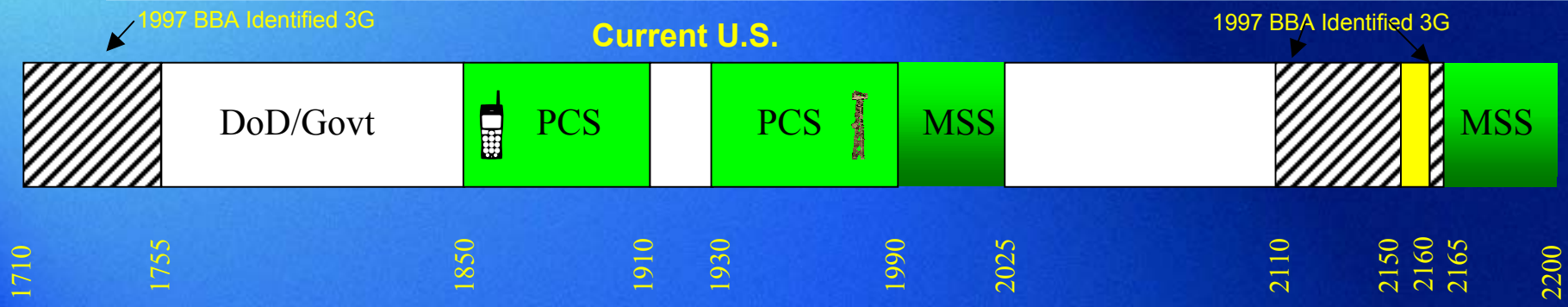
COMMERCIAL WIRELESS SPECTRUM BANDS: U.S. & GLOBAL ALLOCATIONS

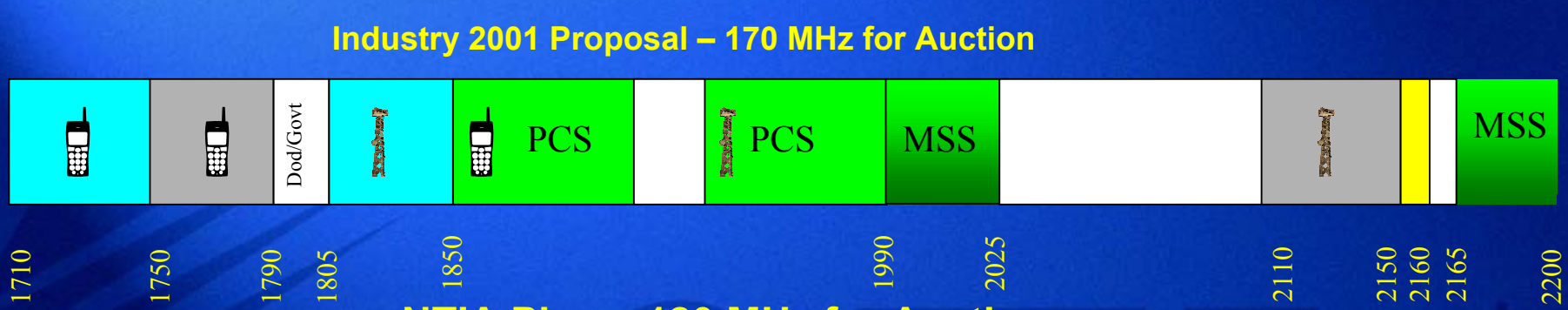


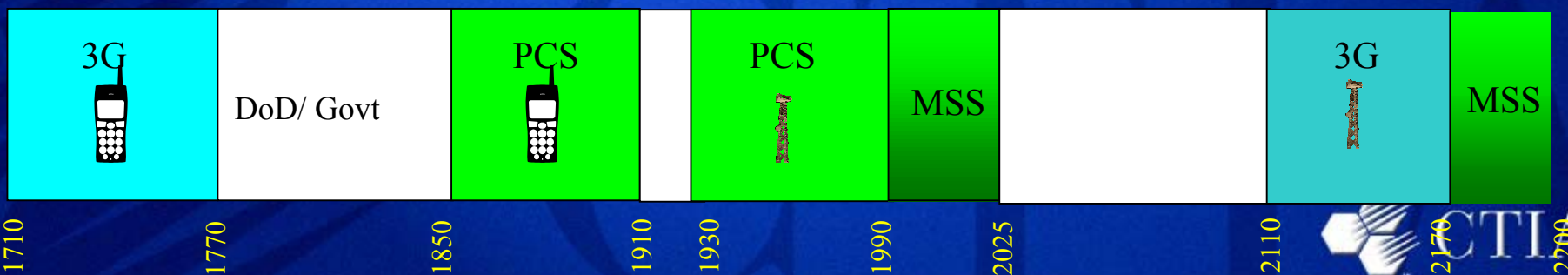
* Implementation varies in some countries. In Asia some countries have also implemented some PCS and other variations from Europe

** Brazil and Venezuela decision to implement DCS bands aligns with Europe and Asia use rather than U.S.

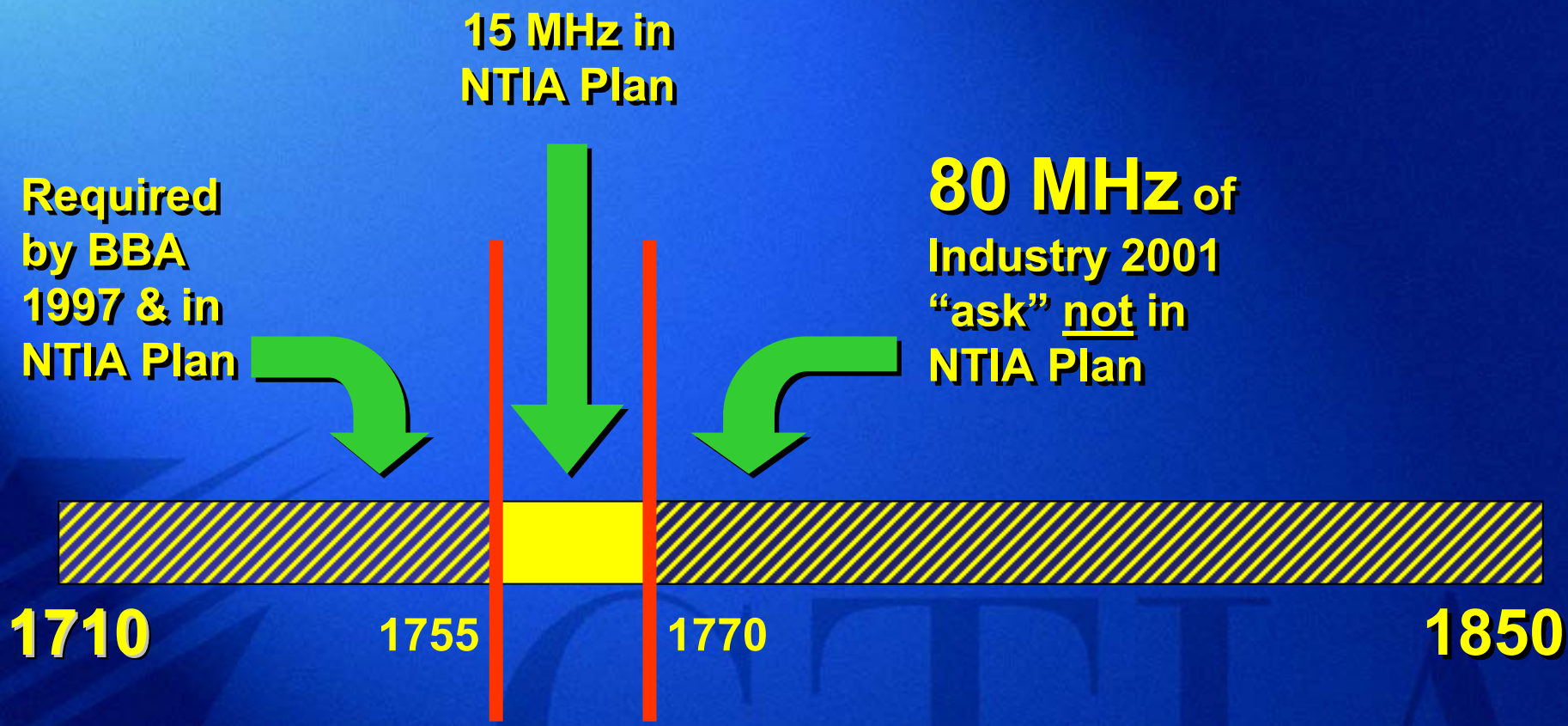
U.S. SPECTRUM BAND PLANS FOR ADVANCED MOBILE SERVICES







DOD SPECTRUM & NTIA PLAN



U.S. GOVERNMENT REQUIREMENTS CAN BE ACCOMMODATED IF *ALL* OF 1710-1770 MHz IS MADE AVAILABLE

- 1710-1755 MHz was reallocated for commercial use in 1997 Balanced Budget Act
- 1755-1770 MHz should be reallocated pursuant to NTIA Plan
- There should be no "protected sites" within the 1710-1770 MHz band

SEVEN MAJOR DOD SYSTEMS

Air Combat

Land Warrior

Tactical Radio

Satellite

Combat Identification

Fixed Microwave

Guided Munitions

3 OF 7 DOD SYSTEMS DO *NOT* OVERLAP WITH 1710-1770 MHZ – NO INTERFERENCE!

- **Air Combat Maneuvering Instrumentation (ACMI) & Tactical Air Combat Training Systems (TACTS)**
  - Two channels aircraft-to-ground at 1778 and 1788 MHz
  - Two channels ground-to-aircraft at 1830 and 1840 MHz
- **Land Warrior**
  - 2400 MHz spread-spectrum technology intended by DoD to be rebanded to 1772-1822 MHz
- **Combat Identification for the Dismounted Soldier (CIDDS)**
  - Developmental system that operates in 1772-1822 MHz band

INTERNATIONAL DEPLOYMENT REMAINS AT RISK

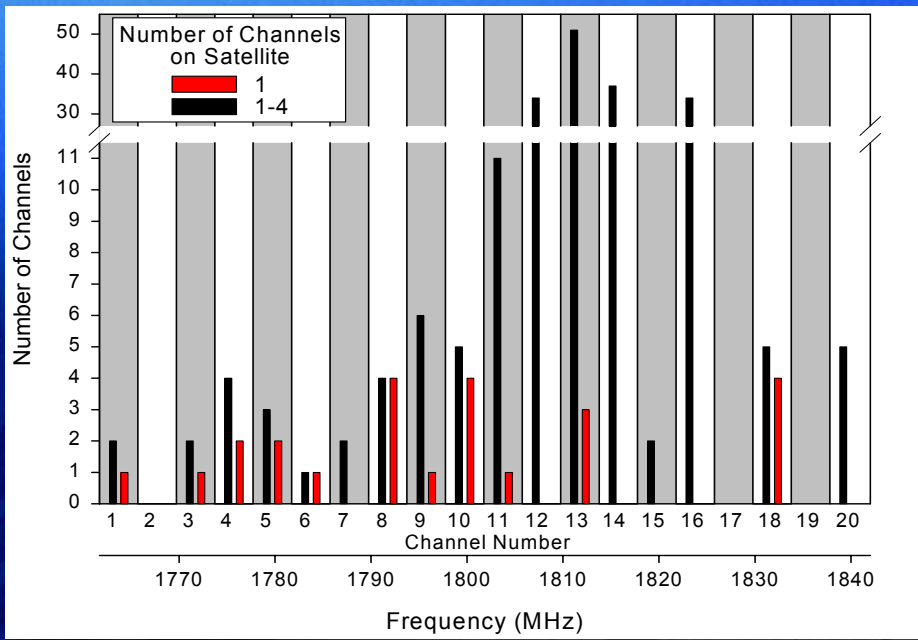
SATELLITE SYSTEMS

Purpose: Uplinks for tracking, telemetry and control. Primarily launch, early operation and anomaly resolution

SOLUTION:

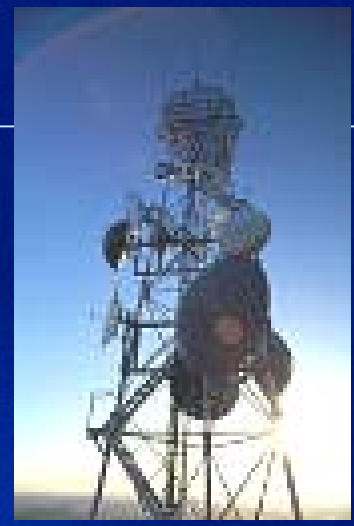
- No 3G Interference into DoD Satellite Systems
- IMT 2000 base stations transmit out-of-band.
- No unacceptable interference into satellites from mobiles.

INTERFERENCE FROM SATELLITE EARTH STATIONS INTO 3G BASE STATIONS (RECEIVING MOBILE-TO-BASE TRANSMISSIONS) CAN BE MANAGED



- Bands under study overlap with only three satellite channels.
  - Only a small number of NGSO satellites operate on these channels.
  - Only a small number of satellite earth stations affected.
  - TT&C requirements are limited
  - Relevant satellites are aging.
  - Relevant satellites can be controlled from multiple locations.
  - Some satellites show availability of alternate control channels.

FIXED MICROWAVE SYSTEMS



Purpose: Similar to commercial point-to-point that were successfully relocated for PCS

Operates in pieces throughout 1710-1770

SOLUTION:

- Relocate to 4 and 7/8 GHz, including systems grandfathered under NTIA final report (OBRA '93)
- Relocate systems only as necessary– some systems could share geographically
- Relocation and upgrade costs paid from auction proceeds (Administration's spectrum relocation fund)
- "A significant amount of frequency spectrum is already allocated to the Government on an exclusive basis for Fixed Service operations in higher frequency ranges." – DoD IMT 2000 Assessment, Feb. 2001, Appendix E, pg. 9

Tactical Radio Relay Systems

Purpose: Transportable systems to relay tactical communication where needed

2,800 radio sets operate throughout 1710-1850 (tunable)

SOLUTION: Same as international deployment

- Significant band sharing potential through strategic placement of IMT-2000 base stations.
  - TRR requirements greatest in rural areas; commercial requirements greatest in urban areas.
  - Geographic sharing may be a feasible solution in many circumstances.
  - Shielding of IMT 2000 base stations could further minimize interference.
- Relocation to alternate spectrum bands and migration to next generation systems can address remaining interference.

Tactical Radio Relay Systems
Army Common User System

(TRI-TAC -- to be replaced by HCLOS)

Current Band
Current Application / Use
Current Use and Descriptive Notes
1755-1850 MHz
Army Common User System (ACUS) - TRI-TAC - to be phased-out and replaced by the HCLOS system

4,000 radio sets -- 2,800 operating in the 1350-1850 MHz range, 2,200 radio sets in the 225-400 MHz range. TRI-TAC and MSE systems are already encountering problems in Europe where 1710-1880 MHz band is used for commercial service. DoD Report page C-6.

Proposed Alternative Band
Current Application / Use
Descriptive Notes
1350-2690 MHz
New HCLOS (High Capacity Line of Sight) system. The DoD Report admits this system is rarely tuned to the 1850-2690 MHz range.

HCLOS system should replace current ACUS and TRI-TAC systems “Mobile Subscriber Equipment” by 2010. DoD Report at page C-20.

Precision Guided Munitions

Purpose: "Smart" Munitions– Remotely launched air-to-ground missiles

Operates in pieces of 1710-1850

SOLUTION: Same as international deployment

- Geographic sharing possibilities short term—Domestic training/testing in remote areas
- Relocate to 7258-8400 MHz in accordance with DoD/Raytheon study over longer term
- Relocation and upgrade costs paid from auction proceeds (Administration's spectrum relocation fund)

16 PROTECTED SITES NEED TO BE CLEARED

- Systems in 16 protected sites include: conventional fixed microwave, tactical radio relay, and precision guided munitions
- In the short term, geographic sharing can enable significant deployment of CMRS
  - Exclusion zones are limited
  - Most protected sites are in remote areas, whereas need for CMRS systems is primarily in urban areas in the initial deployment
- In the longer term, systems in the protected sites should be relocated in the same manner they are in other parts of the 1710-1770 MHz band
  - Conventional fixed microwave can be relocated to 4 and 7/8 GHz
  - Tactical radio relay systems can be retuned or migrated to HCLOS
  - Precision guided munitions can be relocated to 7258-8400 in accordance with DOD/Raytheon study

THE WIRELESS INDUSTRY SUPPORTS THE ADMINISTRATION'S PROPOSED TRUST FUND AND AUCTION TIMETABLES

Trust Fund – FY 2003 Budget indicated:

> "The administration will propose legislation to streamline the current process for reimbursing Federal agencies that must relocate from Federal spectrum which has been re-allocated for auction to commercial users…by creating a central spectrum relocation trust fund. Auction receipts sufficient to cover agencies' relocation costs would be paid into the fund, and Federal agencies would be reimbursed for their relocation costs out of the fund."
>
> - 2003 Administration Budget
> Appendix, page 241

New Auction Dates– FY 2003 Budget indicated Administration would propose legislation that would shift the statutory deadline for the1710-1755 auction from FY 2002 to FY 2004

APPROVAL OF NTIA PLAN IS VITAL TO THE U.S. NATIONAL INTEREST

- DOD
- U.S. Economy
- U.S. Consumers

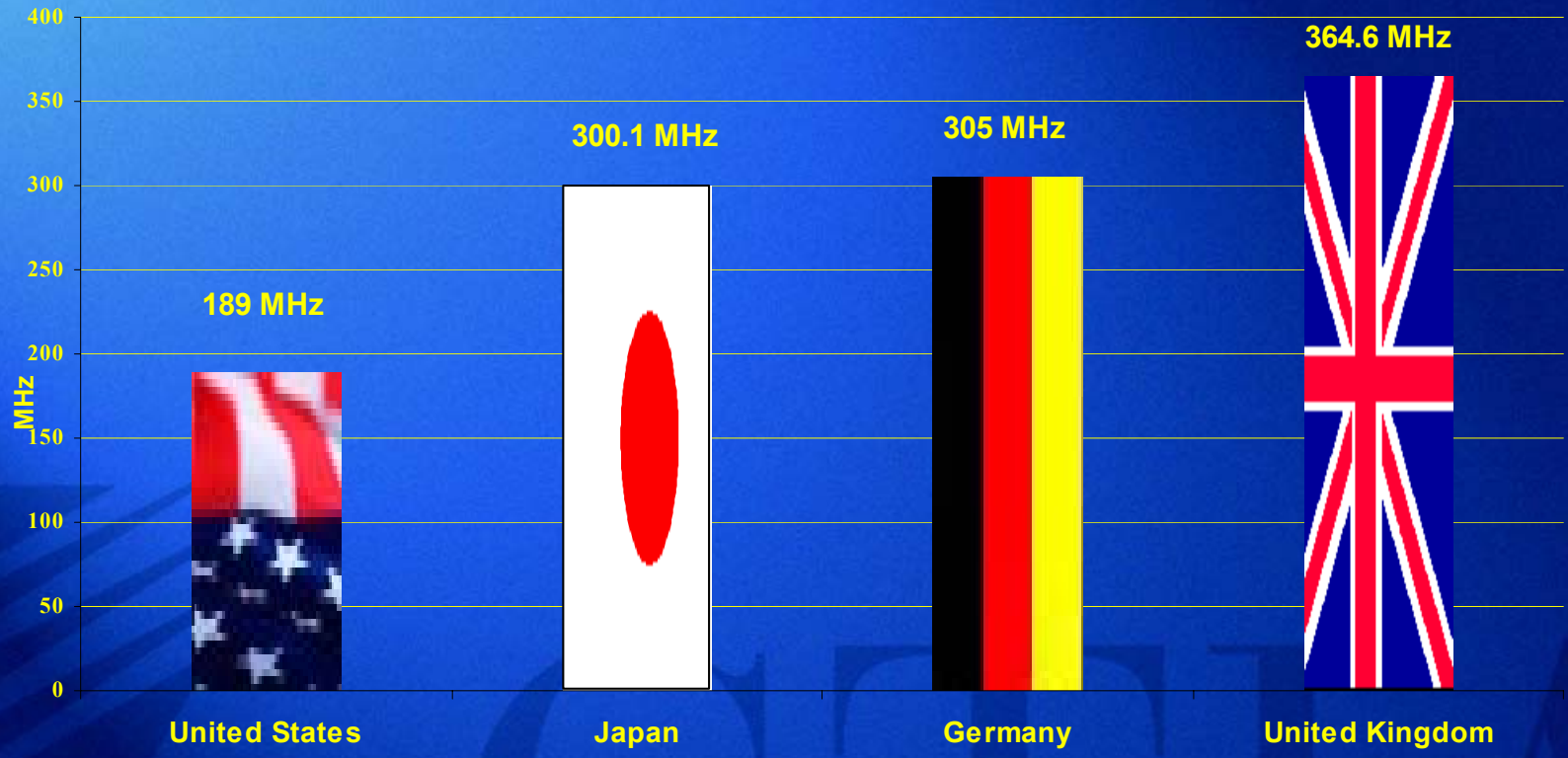
DOD BENEFITS BY APPROVAL OF NTIA PLAN

- International commercial deployment complicates DOD mission overseas
- DoD capabilities guaranteed by comparable spectrum and equipment upgrades
  - NTIA Plan eliminates most interference
  - Remaining interference can be fixed or managed
    - Comparable spectrum
    - Equipment upgrades
- DoD reimbursement guaranteed by up-front payment from auction revenue:
  - Administration proposed Trust Fund
  - Administration proposed Auction Timetables
- DOD migration out of 15 MHz can be managed over time by geographic sharing and other technical measures

NTIA PLAN BENEFITS U.S. ECONOMY

- International harmonization means scope/scale economies
- 120 MHz supports mid-decade demand levels and multiple providers
- Council of Economic Advisors -- $500 billion consumer benefit over next decade

Total Licensed Commercial Wireless Spectrum



U.S. CONSUMERS BENEFIT BY APPROVAL OF THE NTIA PLAN

- Consumers will enjoy new advanced services that would be unavailable without additional spectrum
- Consumers will enjoy less expensive handsets thanks to harmonized spectrum
- Consumers will be able to talk more, use more data services, and pay less per minute if more spectrum is made available to their service providers